



# DEPARTMENT OF APPLIED MATHEMATICS NEWSLETTER



*Solving complex problems with sophisticated mathematical methods*

## Society for Industrial and Applied Mathematics Student Chapter Organizes Its First Conference

The Illinois Institute of Technology Society for Industrial and Applied Mathematics (SIAM) Student Chapter organized its first conference on October 29–30 in the Engineering 1 Building on Main Campus.

The conference focused on recent advances in computational science and statistics. Its theoretical themes included approximation, numerical analysis, statistics, computational finance, stochastic modeling, and discrete mathematics.

The plenary talks were given by professors **Jerry Bona** of the University of Illinois at Chicago, **Charles Chui** of the University of Missouri-St. Louis and Stanford University, and **Wei B. Wu** of the University of Chicago.

“The talks were informative and well received by all,” noted this year’s IIT SIAM Student Chapter Chairperson **Qi Ye** (AMAT 5th year).

Participants included many student-researchers from IIT, University of Chicago, Northwestern University, University of Illinois at Chicago, Argonne National Laboratory, University of Missouri-St. Louis, University of Illinois at Urbana-Champaign, and University of Michigan, Ann Arbor. They had the opportunity to interact with one another, share their research and study interests, and make useful contacts.

Professors Bona and Chui complimented the students on their successful conference. They noted that there are many academic conferences, but a conference organized wholly by students is rare.

“The event went smoothly due to the contributions of many SIAM chapter members. The conference reflected very well on IIT and its students. I hope that it will become a regular event,” said **Fred Hickernell**, applied mathematics chair.

Hickernell gave special recognition to Ye and fellow student organizers **Amlan K. Barua** (Ph.D. candidate), **Rodrigo Rodriguez** (Ph.D. candidate), and **Barrett Leslie** (AMAT 4th year), and student volunteers **Jingran Liu** (Ph.D. candidate), **Ting Gao** (Ph.D. candidate), **Ismail Iyigunler** (Ph.D. candidate), **Shengqiang Xu** (Ph.D. candidate), and **Yizhi Zhang** (Ph.D. candidate).

The details of the conference can be found at [www.math.iit.edu/~siam/workshop](http://www.math.iit.edu/~siam/workshop). Photos by Barrett Leslie are posted on IIT SIAM chapter’s Facebook page: [www.facebook.com/pages/Illinois-Institute-of-Technology-Chapter-of-SIAM-IIT-SIAM-Chapter-/133779623355167](http://www.facebook.com/pages/Illinois-Institute-of-Technology-Chapter-of-SIAM-IIT-SIAM-Chapter-/133779623355167).



The Society for Industrial and Applied Mathematics (SIAM) Chapter at IIT was formed in 2007. The chapter provides a chance for graduate students to develop leadership skills. The chapter has come a long way since 2007. The local SIAM chapter began hosting a monthly Math Tea so that students and faculty can gather and exchange ideas. They followed with a weekly math problem competition for undergraduate students on campus. You can access these math problems at <http://math.iit.edu/~weeklyproblem>. The IIT SIAM chapter has taken its leadership skills to the next level with the first chapter conference.



— Contributing: Qi Ye

# STUDENT SPOTLIGHT



**Who:** Amlan Barua

**Title:** Graduate doctoral student

**Education:** B.S., electrical engineering, Jadavpur University, India

**Research Interests:** Computational material science, boundary integral methods

**Activities:** Reading in general, swimming, reading about history of mathematics and mathematicians

## Why did you choose the doctoral degree in applied math after studying electrical engineering?

I was attracted by the neatness of math. Applied math is a nice crossover from electrical engineering.

Engineering has many problems that need to be solved using computational mathematics. If you use mathematics with engineering you can solve many of those problems and can shed light into new areas of research. Also as our confidence in computational science is increasing, people are relying more than ever on computer-based simulations. Computer simulations are helping to reduce the cost of experiments. They are also helping us to understand phenomena beyond the reach of experiments in a less expensive way. Hence, we need engineering, mathematics, and computer science expertise used together.

## What math projects do you have going at the moment?

I am currently working on computational material science, applying boundary integral methods. Most problems of interest are modeled by partial differential equations (PDEs). The boundary integral method recast the PDEs into integral equations on boundaries.

## What is the main focus of your research?

The main focus is to understand micro-structures that develop within binary alloys. Alloys like nickel-aluminum, iron-carbon systems are of big importance in industry. The micro-structure controls the properties of alloys through their shape and alignment.

## When do you graduate and what are your plans for the future?

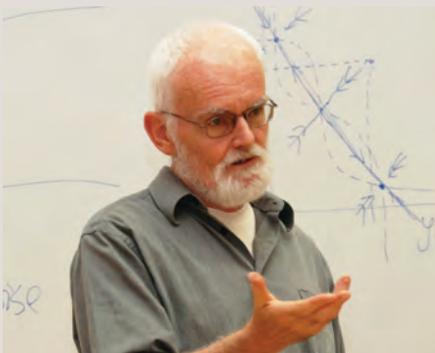
I am scheduled to graduate in May 2012. My goals after graduation are to gain work experience and, hopefully, a position as a computational scientist in material production.

## What words of advice do you have for our incoming applied mathematics students?

One should look for math and practical problems that are of interest. Math is concise but extremely elegant. It really helps us to discover new frontiers of science and technology. Find a problem that is practical and mathematical that rouses interest and helps to improve lives.

*Amlan Barua has a passion for applied mathematics that exemplifies the attitude of the Department of Applied Mathematics. Read more about students like Barua and others in the department on our website, [www.iit.edu/csl/am/people/profiles.shtml](http://www.iit.edu/csl/am/people/profiles.shtml).*

## Karl Menger Lecture and Awards



Philip Holmes of Princeton University

The 2011 Karl Menger Lecturer was **Peter Winkler** of Dartmouth College. His presentation was titled "Statistical Combinatorics."

The 2011 poster contest first-place winners were **Ben Niu** (Ph.D. candidate) and **Daniel Eckhardt** (AMAT 3rd year). The second-place winners were **Yiou Li** (Ph.D. candidate) and **Anita Thomas** (AMAT 2nd year). Niu won the Menger Student Award.

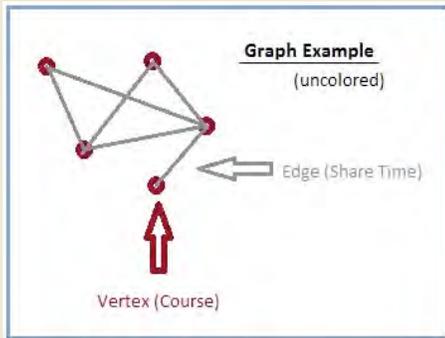
Next year's 6th annual Remembering Karl Menger event will be held April 23–24, 2012, on IIT's Main Campus. **Philip Holmes** of Princeton University [left] will be the guest lecturer. His topic is "One and One Quarter Centuries of Non-Linear Dynamics."

For the latest information and reservations, please visit [www.iit.edu/csl/am/about/menger](http://www.iit.edu/csl/am/about/menger).

## MATH 100 Introduction to the Professions—Treasure Hunt

Professor **Greg Fasshauer**—associate chair, director of undergraduate studies, and undergraduate advisor—conceived the idea of a treasure hunt for students in his course. “After talking to **Mike McCourt** (AMAT '07, adjunct professor) recently, I decided to send the 14 students enrolled in MATH 100 on a mathematical scavenger hunt. The assignment was to find a faculty member or graduate student who could explain topics I chose from the list of publications of faculty on the Department of Applied Mathematics website,” Fasshauer said. The assignment can be found here: [http://math.iit.edu/~fass/100\\_HW\\_Scavenger.pdf](http://math.iit.edu/~fass/100_HW_Scavenger.pdf). **Caleb Hamilton** (AMAT 2nd year) won first place among his fellow students. His entry:

*Chromatic numbers are involved in graphs depicting networks. In order to understand the entire concept, network graphs must*



*be explained completely. These kinds of graphs do not have axes or coordinates. Instead, they are made up of arbitrarily arranged points called “vertices,”*

*which are connected by line segments called “edges,” representing relationships. These are not as abstract as they may sound.*

*A practical example of such a graph could depict college courses and their scheduling. A vertex would represent a single course. Courses would be connected if they overlapped each other's schedules. This graph can now be used for more than just a pretty picture. With all the overlaps depicted correctly in the graph, one can now use this to assign classrooms to courses so there will be no conflicts. In the graph, assigning a classroom to a vertex is called “coloring” and each classroom is called a different “color.” No two courses should be assigned the same classroom at the same time. On the graph, no two vertices that are connected should have the same color. If there are as many classrooms as there are courses, then each course gets its own classroom and there is no conflict, but this situation is unrealistic and inefficient.*

*In real life, one wants to use as few classrooms as possible and to ensure that no two vertices on the graph share an edge and color. To do this, a chromatic number may be used. The chromatic number of any graph with vertices and edges is the minimum number of colors needed to color the vertices of a graph such that no two vertices that share an edge are the same color. It is easy to see how useful these graphs and chromatic numbers might be in showing any number of elements in social interactions, from spreading diseases to highway traffic.*

## Alumni News



Photo by Bonnie Robinson

**Milton Gordon** (Ph.D. MATH '68) is stepping down as president of California State University, Fullerton, after 21 years of service. During Gordon's tenure, enrollment at Cal State Fullerton has increased from 25,600 to 36,000 and student diversity has increased as well. The number of academic degree programs has jumped from 91 in 1990 to 104 currently, now including a doctorate in education. *U.S. News & World Report* ranked Cal State Fullerton #6 among “Top Public Universities—Master’s Institutions in the West” this year. That’s the highest ranking the university has achieved to date.

During his 43 years as a dedicated higher-education leader, Gordon worked for Chicago Public Schools, Loyola University of Chicago, Chicago State University, and Sonoma State University. Gordon is the recipient of numerous honors and awards including the 2010 President’s Award of Excellence from the Hispanic Associations of Colleges and Universities, and the 2011 IIT Alumni Professional Achievement Award.

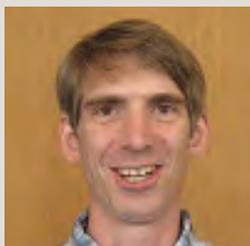
“I am grateful that I’m able to call higher education my life’s work,” Gordon told faculty and students at Cal State. “I will hand over the reins with confidence and pride.”



Department of Applied Mathematics  
Engineering 1 Building, Room 208  
10 West 32nd Street  
Chicago, IL 60616

NonProfit Org.  
US Postage  
**PAID**  
Chicago, IL  
Permit #936

## Applied Math Welcomes New Professors



**Name:** Fred Weening

**Title:** Senior lecturer

**Education:** Ph.D. in complex analysis,  
University of California, San Diego

**Research Interests:** Complex analysis, undergraduate  
mathematics education, discrete mathematics



**Name:** Hualong Feng

**Title:** Visiting assistant professor

**Education:** Ph.D. in computational math,  
University of Michigan

**Research Interests:** Computational mathematics,  
fast summation methods

## Faculty News

**Professor Jinqiao “Jeffrey” Duan**, director of the Laboratory for Stochastic Dynamics, on leave from IIT, has taken the position of associate director of the Institute for Pure and Applied Mathematics (IPAM), a National Science Foundation-funded institute at the University of California, Los Angeles. During his two-year tenure, Duan will facilitate IPAM's long-term and short-term programs, which bring together diverse groups of scholars to share their research in cutting-edge areas.

**Assistant Professor Lulu Kang** was on leave for the fall 2011 semester doing research in the Program on Uncertainty Quantification being held at the Statistical and Applied Mathematical Sciences Institute in North Carolina.

**Assistant Professor Robert Ellis** was promoted with tenure to associate professor in the Department of Applied Mathematics.

## Contact Us

Please send news of your professional or other achievements to:

**Illinois Institute of Technology**  
Department of Applied Mathematics  
Engineering 1 Building, Room 208  
10 W. 32nd Street  
Chicago, IL 60616

**Phone:** 312.567.8980

**FAX:** 312.567.3135

**newsletter@math.iit.edu**

**www.iit.edu/csl/am**

Would you like email updates?

Please email us at

**newsletter@math.iit.edu**

**Fred Hickernell**

*Department Chair*

**Gladys Collins**

*Department Coordinator*

**Myrna Walker**

*Administrative Assistant and Newsletter Editor*